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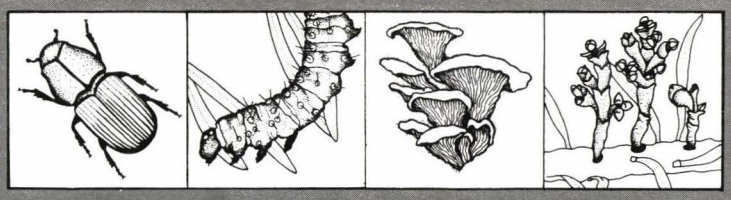

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MOUNTAIN PINE BEETLE STATUS UPDATE Plains Ranger District, Lolo National Forest 1979

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ABSTRACT

Mountain pine beetle populations increased in 1979 in the Thompson River drainage to levels predicted following the 1978 attack period. New attacks in 1979 averaged 27 per acre. Current estimates indicate another 25 percent of the remaining lodgepole pine could be killed in 1980.

INTRODUCTION

Despite extremely cold temperatures during December 1978 and January 1979 and a resultant tree per acre mortality reduction in many locales, the area covered by each of several mountain pine beetle 1/ infestations increased markedly throughout most of the State in 1979. This increase in infestation should result in an intensification of beetle-caused tree mortality in 1980. The beetle, though slowed for a time, will rebound quickly as long as susceptible host material remains.

We described the infestation potential for the Plains Ranger District (RD), specifically the Thompson River drainage, in a report in April 1979 (Gibson et al. 1979). This report is an update of that evaluation.

METHODS

Survey methods were basically the same as those detailed in the earlier report. Nine areas within the Plains RD, or close to it, were selected from which to gather stand data (figure 1). Sites were chosen to represent an array of infestation intensities--from areas of known mortality to ones of predominantly green, but susceptible stands. Variable-radius plots were established on transects at 5-chain intervals. Usually we took stand data at 10 points in a particular area. In addition to those nine areas, we have included data obtained from 30 permanent plots in the Murr Creek-North Fork Murr Creek drainage (Gibson et al. 1980). In all of those plots,

1/ Dendroctonus ponderosae Hopkins

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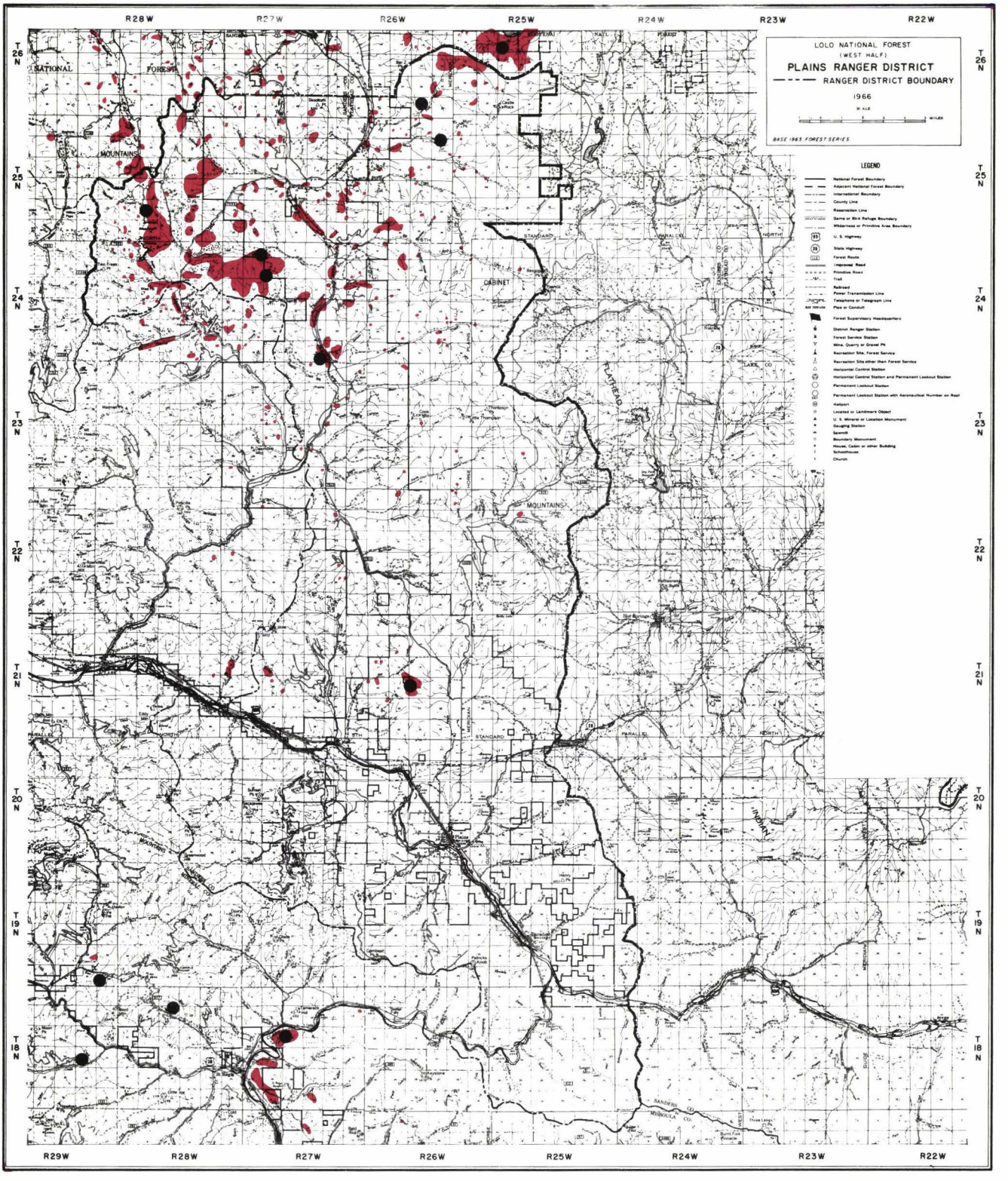

Figure 1.--Mountain pine beetle infestation on the Plains Ranger District, as detected during annual aerial detection survey in 1979. Red polygons indicate 1979 faders (1978 attacks). Black (●) shows trend plot locations.

survey techniques were identical. Once a plot center was established, a relaskop (Basal Area Factor 10) was used to determine "in" trees. The diameter of each tree determined to be within the plot was measured and recorded regardless of species. Mountain pine beetle host trees were then categorized with a damage classification: green (unattacked), new attack, old attack (fader), older dead (snag), pitchout (unsuccessful attack), and strip attack (current attack on one side but still alive). Dead non-host trees were not tallied. The height of the first two trees of each species was measured for volume estimations. Each plot center also served as the center of a 1/300-acre plot from which regeneration data were accumulated. All data were analyzed using the computer program INDIDS (Bousfield 1979).

To supplement this variable plot data, we have included information gathered from three "check blocks" of the Thompson River Demonstration Area near Fishtrap Lake. These blocks, on which no cutting was done, vary in size; one being 21 acres, another 15 acres, and the final one 21 acres. Plots in these areas were 1/4-acre fixed radius plots and were established on 5-chain transects throughout the blocks. Current-year beetle attack data only were accumulated on these plots. In the first block there were 13 plots, the second 7 plots, and the third 11 plots. Block summaries were totaled and a weighted average computed for the 31 plots. These results are listed, but were not summarized with the variable plot data since survey techniques were not alike.

RESULTS

Tables 1 and 2 contain results of the 130 survey plots. Table 1 shows mountain pine beetle mortality data in lodgepole pine. This data indicates an average of 27.1 new attacks/acre in 1979 (range 0-122.8/acre). A note of interest is that in a recently completed State-wide survey to measure mountain pine beetle mortality, that area containing the 122.8 new attacks/acre (Richards Lookout Road) was found to have the most intense level of mortality in Montana 2/ in 1978. Table 2 lists green stand structure for each site surveyed. An average of nearly 160 uninfested lodgepole pine/acre ≥5" d.b.h. (diameter breast height) remain. Average diameter of the remaining lodgepole pine is nearly 8". According to Amman et al. (1977) this criterion, along with sufficient age and appropriate elevation-latitude, would indicate much of the remaining green lodgepole is "high-hazard" for susceptibility to mountain pine beetle attack.

Finally, table 3 contains the accumulative data from the demonstration check blocks. It shows an average of 3.5 new attacks/acre in that area.

2/ FI&DM, Northern Region, unpublished data

Table 1.--Mountain pine beetle mortality on the Plains RD, 1979
(LPP $\geq$ 5" d.b.h.)

Plot		Green	1979 Attack	1979 Strip	1978 Attack	Snag	Pitch-Out	Other B.B.	Unk Mort.	Total MPB Mortality
W River RD	T/A	145.4	6.3	0	41.4	14.7	5.6	45.9	20.4	62.4
	BF/A	993.5	125.5	0	672.5	373.0	-	384.0	-	1,171.0
Richards	T/A	185.6	122.8	2.3	45.6	26.3	59.2	24.1	15.3	194.7
LO RD	BF/A	1,112.6	1,654.5	-	1,192.8	1,016.6	248.8	123.5	-	3,863.9
Buffalo	T/A	132.2	18.1	0	7.6	12.1	4.1	2.3	5.6	37.8
Bill Cr	BF/A	1,874.9	293.8	0	290.3	940.6	-	130.3	-	1,524.7
Mullan	T/A	106.2	0	0	0	0	2.3	3.0	0	0
Gulch	BF/A	1,127.3	0	0	0	0	-	-	0	0
E Fk Twelve	T/A	186.9	0	0	0	0	0	0	0	0
Mile Cr	BF/A	750.9	0	0	0	0	0	0	0	0
Ward	T/A	26.1	0	0	0	2.2	0	0	0	2.2
Creek	BF/A	141.7	0	0	0	135.3	0	0	0	135.3
St. Regis	T/A	258.1	0	0	3.7	38.7	14.8	0	6.1	42.4
	BF/A	4,382.7	0	0	148.4	2,246.6	785.5	0	-	2,395.0
Richards	T/A	74.6	58.4	7.3	44.6	8.1	23.8	2.5	0	111.1
LO #2	BF/A	1,167.4	1,430.4	-	649.1	278.8	-	-	0	2,358.3
McGregor	T/A	37.2	68.2	0	51.6	48.0	4.9	0	0	167.8
Lake	BF/A	-	857.9	0	826.4	1,483.4	-	0	0	3,167.7
Murr	T/A	291.7	3.6	1.3	4.2	5.4	0	0	0	13.2
Cr	BF/A	4,648.1	45.9	-	88.0	160.4	0	0	0	294.3
Plot	T/A	158.8	27.1	1.0	19.9	16.5	9.2	6.0	3.6	63.5
$\bar{X}$(130 plots)	BF/A	2,317.8	412.1	-	374.6	649.1	147.7	58.0	-	1,435.8

Table 2.—Green Stand Data, Plains RD, 1979

		Lodgepole pine		Western larch		Douglas-fir		Western redcedar		Subalpine		Grand fir		Ponderosa pine		Western white pine		Engelmann spruce		Whitebark/ Limber pine		Total	
		T/A 1/	BF/A 2/	T/A	BF/A	T/A	BF/A	T/A	BF/A	T/A	BF/A	T/A	BF/A	T/A	BF/A	T/A	BF/A	T/A	BF/A	T/A	BF/A	T/A	BF/A
West River	<5	150.0	-	30.0	-	990.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,170.0	-
RD	≥5	145.4	993.5	6.2	1,235.2	35.6	419.6	-	-	-	-	-	-	3.7	340.6	-	-	-	-	-	-	190.9	2,988.9
Richards	<5	-	-	-	-	1,140.0	-	-	-	30.0	-	30.0	-	-	-	-	-	-	-	-	-	1,200.0	-
LO RD	≥5	185.6	1,112.6	4.0	-	94.3	3,455.0	-	-	-	-	0.8	169.7	-	-	-	-	-	-	-	-	284.7	4,737.3
Buffalo	<5	30.0	-	120.0	-	810.0	-	-	-	-	-	270.0	-	-	-	-	-	-	-	-	-	1,230.0	-
Bill Cr	≥5	132.2	1,874.9	41.4	3,409.7	42.9	1,018.1	-	-	-	-	25.9	1,033.0	14.9	2,060.6	-	-	-	-	-	-	257.3	9,396.3
Mullan	<5	30.0	-	30.0	-	60.0	-	-	-	-	-	870.0	-	-	-	60.0	-	-	-	-	-	1,050.0	-
Gulch	≥5	106.2	1,127.3	6.9	201.3	26.4	2,040.5	16.1	284.2	1.6	128.2	83.0	3,765.6	0.2	260.4	23.8	5,586.9	-	-	-	-	264.2	13,394.4
E Fk Twelve	<5	30.0	-	-	-	240.0	-	-	-	120.0	-	690.0	-	-	-	30.0	-	30.0	-	-	-	1,140.0	-
Mile Cr	≥5	186.9	750.9	16.2	425.0	27.9	1,731.8	-	-	40.3	162.8	28.8	2,100.7	0.7	114.5	-	-	-	-	-	-	300.8	5,285.7
Ward Cr	<5	-	-	-	-	150.0	-	60.0	-	-	-	690.0	-	-	-	30.0	-	30.0	-	-	-	960.0	-
	≥5	26.1	141.7	1.5	1,669.0	15.5	2,836.7	4.5	756.2	-	-	91.7	6,158.6	5.7	2,412.6	7.5	2,384.5	-	-	-	-	152.5	16,359.3
St. Regis	<5	210.0	-	90.0	-	450.0	-	-	-	-	-	-	-	120.0	-	-	-	-	-	-	-	870.0	-
	≥5	258.1	4,382.7	0.4	193.8	17.9	2,134.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	276.4	6,710.7
Richards	<5	-	-	-	-	990.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	990.0	-
LO #2	≥5	74.6	1,167.4	43.3	1,240.7	90.1	4,520.4	-	-	-	-	-	-	5.1	1,579.0	-	-	-	-	-	-	213.1	8,507.5
McGregor	<5	540.0	-	105.0	-	315.0	-	-	-	30.0	-	-	-	-	-	-	-	30.0	-	-	-	1,020.0	-
Lake	≥5	37.2	-	40.9	2,292.1	31.8	1,814.4	-	-	-	-	3.4	-	-	-	-	-	4.5	43.8	-	-	117.8	4,150.3
Murr Cr	<5	140.0	-	20.0	-	230.0	-	-	-	-	-	30.0	-	-	-	-	-	40.0	-	20.0	-	480.0	-
	≥5	291.7	4,648.1	62.0	1,406.9	19.4	96.5	-	-	-	-	-	-	-	-	-	-	4.9	22.5	-	-	378.0	6,174.0
Plot	<5	150.0	-	41.5	-	473.1	-	4.6	-	16.2	-	203.1	-	9.2	-	9.2	-	18.5	-	4.6	-	930.0	-
X (130 plots)	≥5	158.8	1,961.2	29.8	1,321.5	36.3	1,698.0	1.6	80.0	3.2	22.4	18.2	1,017.5	2.3	520.6	2.4	613.2	1.8	11.9	-	-	254.6	7,246.4

1/ Trees per acre
2/ Board feet per acre

Table 3.--New attack data - Check blocks in demonstration area, Plains RD, 1979

Area	$\bar{X}$ New attacks/acre	$\bar{X}$ Pitchouts/acre
Block #7 (13 plots)	0.0	0.3
Block #18 (7 plots)	14.3	7.4
Block #27 (11 plots)	0.7	2.9
Average (3 blocks)	3.5	2.8

DISCUSSION

Applying Baker's formula (Baker 1968) to the data accumulated on the Plains RD in 1979, we predicted a mortality rate for 1979 of 27.1 trees/acre (Gibson et al. 1979). The average mortality obtained from the 130 variable plots cruised after beetle flight was precisely 27.1 trees/acre. The fact that predicted and actual mortality in this instance were the same is mostly coincidental. It does, however, illustrate the usefulness of the buildup ratio as a predictor of future mortality. Applying this year's data to obtain a predicted mortality figure for 1980 reveals:

Buildup ratio x/x_1 (where "x" is current year mortality, "x_1" is previous year mortality) = 27.1/19.9 = 1.36:1

Predicted Mortality (1980) = bx (where "b" is buildup ratio and "x" is current year mortality) = (1.36) (27.1) = 36.9 trees/acre

Assuming this predicted mortality is accurate, and looking at the number of green lodgepole/acre remaining (table 1), we find that potentially another 25 percent of the lodgepole component of the stand could be killed in 1980. It is likewise assumable that unless the land manager intervenes to alter stand structure (and barring some naturally occurring phenomena such as cold temperatures or fire), the beetle will continue its annual tree-killing until all susceptible lodgepole are eliminated.

Management alternatives based on present and desired stand characteristics have been developed. These are outlined in detail in the preceding report (Gibson et al. 1979). It need only be stressed that unless the forester manages his stands, the beetle will. If the beetle's "management" does not provide desired outputs from the timbered lands, it is incumbent upon the forest manager to alter that management scheme.

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